United States Environmental Protection Agency
Office of Water (4606)
EPA 816-F-00-002
February 2000

# Drinking Water: Past, Present, and Future

*This fact sheet contains highlights from a larger report, "25 Years of the Safe Drinking Water Act: History and Trends." Please refer to the full report for details and references. You may order a copy of the report, as well as many other EPA drinking water documents, by calling the Safe Drinking Water Hotline at (800) 426-4791, or you may view the report online at http://www.epa.gov/safewater/sdwa25/sdwa.html*

Civilizations have faced the challenge of obtaining safe drinking water for thousands of years. As a global society, we have learned a great deal about drinking water quality. However, we still have much to learn about the health effects of drinking water contaminants, the testing and treatment technologies required to detect and remove contaminants, and ways to protect our water sources from contamination.

During the 1800s, scientists began to gain an understanding of the sources and effects of drinking water contaminants, especially those that were not visible to the naked eye. By the early 1900s, engineers had developed techniques such as filtration and chlorination to prevent waterborne microbes from causing disease.

## Highlights of the Safe Drinking Water Act

- Authorizes EPA to set enforceable health standards for contaminants in drinking water
- Requires public notification of water systems' violations and annual reports to customers on contaminants found in their drinking water
- Establishes a federal-state partnership for regulation enforcement
- Includes provisions specifically designed to protect underground sources of drinking water
- Requires disinfection of surface water and, as necessary, ground water used for drinking water
- Requires filtration of all surface water supplies, except those with pristine, protected sources
- Establishes a multi-billion dollar state revolving loan fund for water system upgrades
- Requires an assessment of the vulnerability of all drinking water sources to contamination

Federal regulation of drinking water quality began in 1914, when the U.S. Public Health Service set standards for some disease-causing microbes. These standards were revised and expanded and eventually, with minor modifications, all 50 states adopted the final 1962 Public Health Service standards either as regulations or as guidelines.

By the late 1960s, man-made chemicals began to have a noticeably negative impact on the environment. Health concerns spurred the federal government to conduct several studies on the nation's water supplies which showed that many chemicals were present in treated drinking water.

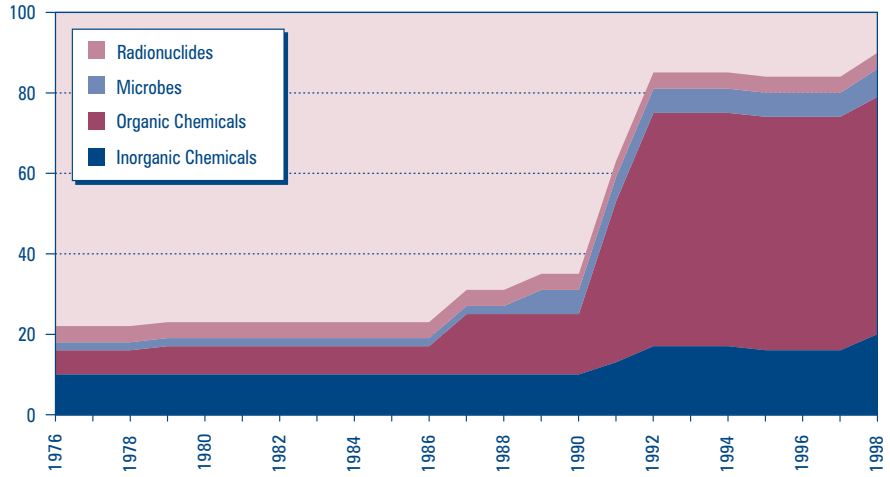
Increased awareness of environmental and health problems in the early 1970s eventually led to the passage of several federal laws, one of which was the Safe Drinking Water Act (SDWA) of 1974. SDWA is administered by the U.S. Environmental Protection Agency (EPA) and its partners.

SDWA aims to ensure that public water systems meet national standards that protect consumers from the harmful effects of contaminants in drinking water.

SDWA requires EPA to regulate contaminants that present health risks and are known to, or are likely to, occur in public drinking water supplies. For each contaminant requiring regulation, EPA sets a legal limit on the amount of the contaminant allowed in drinking water (states may also set limits that are at least as strict as EPA's). Since 1974, the number of contaminants regulated under SDWA has quadrupled [see figure 1 next page].

If a system violates EPA or state regulations, it must notify the public. States are required to report violations to EPA's database, the Safe Drinking Water Information System (SDWIS). This fact sheet focuses mostly on community water systems (systems that provide drinking water to the same people year-round), because they are subject to all SDWA regulations and serve most Americans. The population being served by community water systems with no violations of health-based standards has increased steadily from 83 percent in 1994 to 89 percent in 1998 [see figure 2].

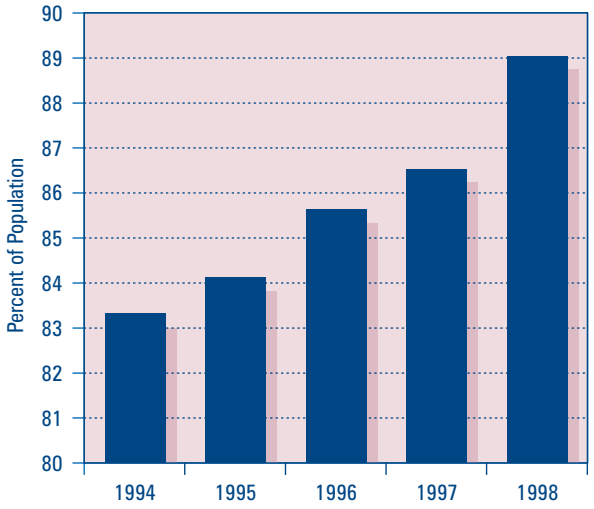
**Figure 1. Number of Contaminants Regulated Under the Safe Drinking Water Act, by Contaminant Type**




## Compliance Trends

One way to gauge whether the quality of our nation's drinking water has improved under SDWA is to examine water systems' compliance with federal regulations. Evaluations of the quality of compliance data in SDWIS have shown that a significant number of violations have not been reported to SDWIS. EPA and its partners are correcting these data deficiencies. While deficiencies make it difficult to look at historical compliance trends using SDWIS data, this is the best source of drinking water data that exists on a nationwide basis. Therefore, we present the following examples of compliance trends, recognizing that the actual number of systems in violation may be higher than shown.

**Figure 2. Percent of Population Served by Community Water Systems With No Violations of Health-Based Standards**




### Total Coliform: The Most Frequently Violated Regulation

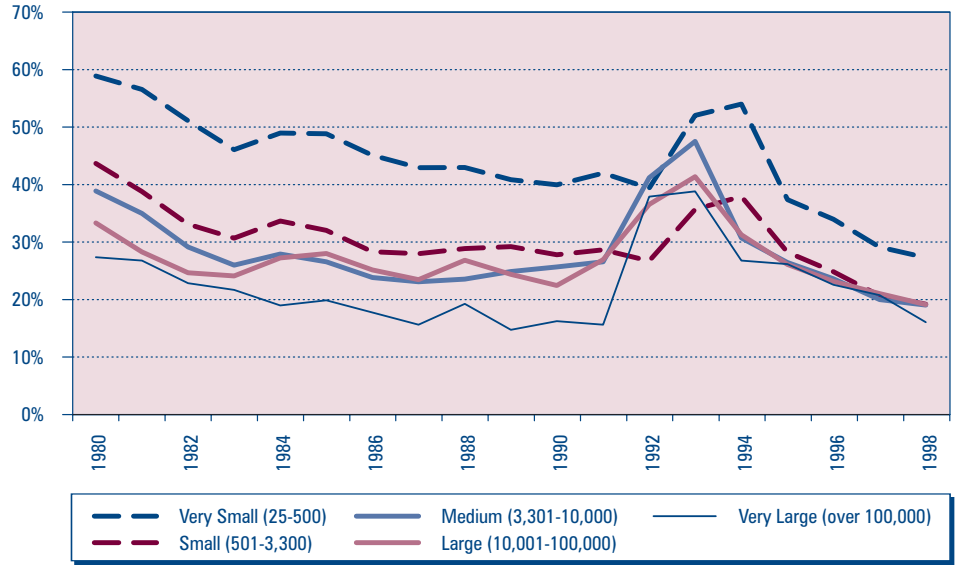
Coliforms are a group of bacteria that are common in both the environment and the digestive tracts of humans and animals. Most of these bacteria are harmless; however, their presence in water at any level indicates that disease-causing microbes may also be in the water.

Since 1980, over 80 percent of all community water systems with any health-based violation had a violation for total coliform. However, the number of systems with total coliform violations has decreased fairly steadily since 1980, by about 200 systems per year.

### System Size Affects Violation Trends

Community water systems of all sizes have generally followed the same decreasing trend in violations since 1980, except for a period in the early 1990s when systems of all sizes struggled to comply with several new regulations [see figure 3]. In recent years, it appears that the gap between the percentage of small, medium, large and very large systems with violations has been closing.

**Figure 3. Percent of Community Water Systems with Any Violations, by System Size**



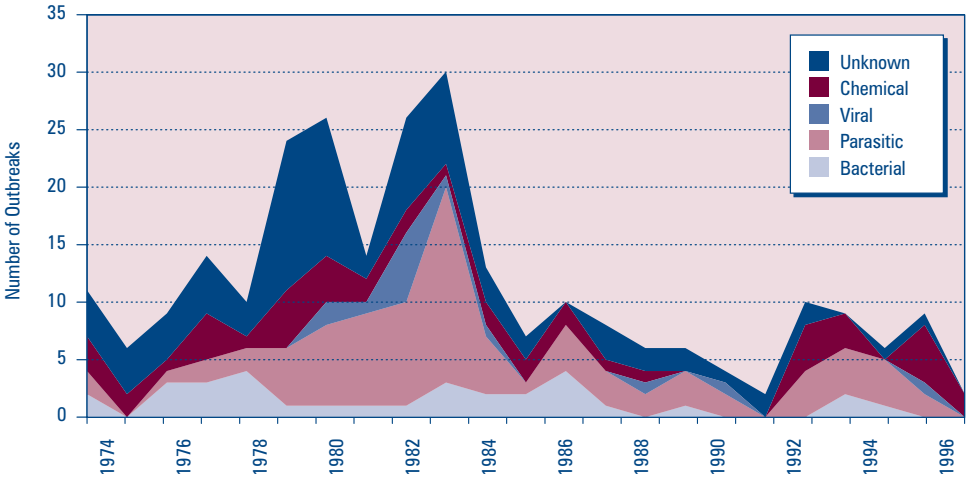

However, very small systems are still almost 50 percent more likely to violate regulations than all other system sizes. Very small systems generally have the least amount of resources necessary to maintain and upgrade equipment.

## Waterborne Disease Outbreaks

Another way to look at the quality of our nation's drinking water is to examine whether the number of people becoming ill from drinking contaminated water has decreased over the last 25 years. EPA and the Centers for Disease Control and Prevention (CDC) believe that the vast majority of waterborne disease outbreaks are never identified or reported. For this reason, EPA and CDC have been working together to gather as much data as possible on waterborne disease outbreaks across the country. Although the number of reported outbreaks in the U.S. has generally declined since the early 1980s [see figure 4], some of the more recent outbreaks have been very serious, causing numerous people to become ill and, in some cases, even causing death.

In the last ten years, EPA has taken several actions to minimize outbreaks of waterborne disease by requiring disinfection of most surface water supplies (lakes, rivers, and reservoirs) and frequent testing for microbes. In 2000, EPA plans to propose a regulation that will require protection and treatment of ground water sources.

**Figure 4. Number of Waterborne Disease Outbreaks in Community Water Systems and Their Causitive Agents (1974-1996)**




## The Cost of Safe Drinking Water

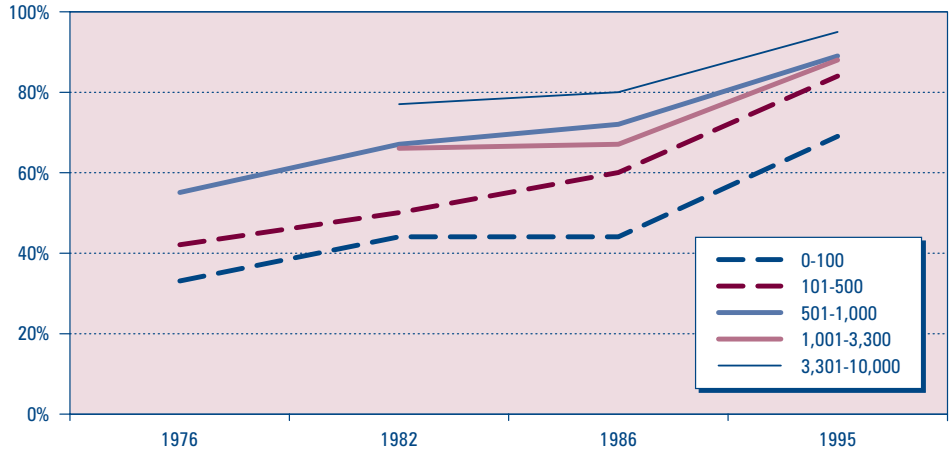
The cost of tap water is rising as suppliers maintain and upgrade aging treatment plants, comply with more regulations, and serve a growing population. In most cases, these increasing costs have caused water suppliers to raise their water rates. However, despite rate increases, water is generally

still a bargain when compared with other utilities such as electricity and telephone service. It is also important to recognize that, due to historic underpricing, the rates most water systems charge their customers do not reflect the true cost of treating and delivering drinking water.

## Treatment versus Prevention

Over the years, the number of water systems treating their water has increased [see figure 5]. Although treatment can be very effective at removing contaminants from drinking water, it can sometimes be expensive. Also, removing contaminants from drinking water does not necessarily remove them from the environment (e.g., contaminants removed from water are often disposed on land or released into the air). A more environmentally sustainable solution to drinking water contamination is to prevent pollutants from reaching drinking water sources in the first place. Several programs that protect source water exist under SDWA and other environmental laws.

**Figure 5. Percentage of Community Water Systems Providing Any Treatment, by Population Served**




## Challenges Ahead

While tremendous progress has been made over the last quarter century in improving the testing, treatment, source protection, and provision of drinking water to the public, numerous challenges remain:

- More drinking water health information will need to be provided in a timely fashion to consumers who are most vulnerable to contaminants. This is especially important as cancer survivors and HIV/AIDS patients increase in number, and the elderly make up a growing percentage of the population.
- The public and private sectors must work together to more effectively and efficiently conduct sound scientific research in order to continue learning about the health effects of known contaminants, and to begin studying emerging contaminants.
- Tap water must be conserved and its sources protected in order to lessen the negative impacts that trends in increasing population, urbanization and development may have on the future availability and quality of drinking water.
- Consumers must recognize that high quality tap water comes at a price, but one that can be significantly less than alternatives such as bottled water.
- Consumers must also recognize that their actions affect the quality of their source water and the level of treatment that is required to allow safe drinking water to flow from their taps.